



PSGR Krishnammal College for Women



**DEPARTMENT OF COMPUTER SCIENCE**

**CHOICE BASED CREDIT SYSTEM &  
OUTCOME BASED EDUCATION SYLLABUS**

**BACHELOR OF COMPUTER SCIENCE  
2020 - 2023 BATCH**

### **Programme Outcomes**

After completion of the programme, the student will be able to

**PO1:** Provides a solid foundation in the discipline of Computer Science and enable students to formulate computational solutions to real life problems.

**PO2:** To possess knowledge to identify, analyze, design for an optimized solution using appropriate algorithms of varying complexity using cutting edge technologies.

**PO3:** To develop skills in software and hardware maintenance so as to enable the students to establish a productive career in industry, research and academia.

**PO4:** Equip the students to meet the industrial needs by utilizing tools and technologies with the skills to communicate effectively among peers.

**PO5:** Foundation graduate programme which induces continuous improvement of knowledge and act as a platform for higher studies and engage in research.

### **Programme Specific Outcomes**

The students at the time of graduation will

**PO1:** Graduates will apply domain knowledge and problem-solving skills to solve real time problems.

**PO2:** Empowers graduates with good employability skills and ensures exceptional career opportunities in IT / ITeS / ITis companies.

**DEPARTMENT OF COMPUTER SCIENCE**  
**CHOICE BASED CREDIT SYSTEM & OUTCOME BASE EDUCATION**  
**SYLLABUS & SCHEME OF EXAMINATION**  
**BACHELOR OF COMPUTER SCIENCE - 2020 - 2021 BATCH**

**Programme & Branch B.Sc. Computer Science**

**Scheme of Examination**  
**Applicable to the students admitted during the academic year 2020 – 2021 onwards**

| Semester | Part                            | Subject Code   | Title of paper   | Instruction hours / week | Contact Hours | Tutorial Hours | Duration of Examination | Examination Marks |     |       | Credits |
|----------|---------------------------------|--|--|--------------------------|---------------|----------------|-------------------------|-------------------|-----|-------|---------|
|          |                                 |  |  |                          |               |                |                         | CA                | ESE | Total |         |
| I        | I                               | TAM2001/<br>HIN2001 /<br>FRE2001                                     | Language I   | 6                        | 86            | 4              | 3                       | 40                | 60  | 100   | 3       |
|          | II                              | ENG2001/<br>ENG20 F1   | English Paper I /<br>Functional English Paper I          | 6                        | 86            | 4              | 3                       | 40                | 60  | 100   | 3       |
|          |                                 |  | <b>Group A - Core</b>                                    |                          |               |                |                         |                   |     |       |         |
|          | III                             | PP20C01  | <b>Core 1:</b> Programming in C                          | 4                        | 56            | 4              | 3                       | 40                | 60  | 100   | 4       |
|          | III                             | CS20CP1  | <b>Programming Lab 1:</b><br>C Programming Lab           | 3                        | 45            | -              | 3                       | 40                | 60  | 50*   | 2       |
|          | III                             | CS20C02  | <b>Core 2:</b> Computer Organization and<br>Architecture | 3                        | 41            | 4              | 3                       | 40                | 60  | 100   | 3       |
|          |                                 |  | <b>Group B - Allied I</b>                                |                          |               |                |                         |                   |     |       |         |
|          | III                             | TH20A03  | <b>Allied A1</b><br>Numerical and Statistical Techniques | 6                        | 86            | 4              | 3                       | 40                | 60  | 100   | 5       |
|          |                                 |  | <b>Non-Tamil Students</b>                                |                          |               |                |                         |                   |     |       |         |
| IV       | NME18ES/<br>NME19A1/<br>NME19B1 | Introduction to Entrepreneurship /<br>Advance Tamil /<br>Basic Tamil | 2  | 28                       | 2             | 2              | 50                      | 50                | 100 | 2     |         |
| II       | I                               | TAM2002/<br>HIN2002 /<br>FRE2002                                     | Language II  | 6                        | 86            | 4              | 3                       | 40                | 60  | 100   | 3       |
|          | II                              | ENG2002/<br>ENG20F2  | English Paper II /<br>Functional English Paper II        | 6                        | 86            | 4              | 3                       | 40                | 60  | 100   | 3       |
|          |                                 |  | <b>Group A - Core</b>                                    |                          |               |                |                         |                   |     |       |         |
|          | III                             | CS20C03  | <b>Core 3:</b> Java Programming                          | 5                        | 71            | 4              | 3                       | 40                | 60  | 100   | 5       |

|                |     |                      |   |                |    |   |                    |     |    |     |       |
|----------------|-----|----------------------|---|----------------|----|---|--------------------|-----|----|-----|-------|
|                | III | CS20CP2              | <b>Programming Lab 2:</b><br>Java programming and<br>Bioinformatics Lab                                     | 5              | 75 | - | 3                  | 40  | 60 | 50* | 3     |
|                |     |                      | <b>Group B - Allied II</b>  |                |    |   |                    |     |    |     |       |
|                | III | TH20A06              | <b>Allied A2</b><br>Discrete Mathematics  | 6              | 86 | 4 | 3                  | 40  | 60 | 100 | 5     |
|                | IV  |                      | <b>Open Course</b><br>(Self-Study - Online)   | -              | -  | - | -                  | -   | -  | -   | Grade |
|                |     | NME19A2/<br>NME19B2  | ** Advanced Tamil /<br>Basic Tamil  | -              | -  | - | -                  | -   | -  | -   | Grade |
|                | VI  | REG16EE              | Effective English Communication   | 2              | -  | - | 2                  | 50  | 50 | 100 | 2     |
|                | VI  | NM12GAW              | General Awareness   | Self-<br>Study | -  | - | Onl<br>ine<br>test | 100 | -  | -   | Grade |
|                |     |                      | <b>Group A - Core</b>   |                |    |   |                    |     |    |     |       |
| III            | III | CS19C04              | Core 4: Operating System  | 5              | 71 | 4 | 3                  | 40  | 60 | 100 | 4     |
|                | III | CS19C05              | Core 5: Data Structures   | 5              | 71 | 4 | 3                  | 40  | 60 | 100 | 4     |
|                | III | PDB2003              | Core 6: Database<br>Management Systems  | 5              | 71 | 4 | 3                  | 40  | 60 | 100 | 4     |
|                | III | CS20CP3              | Programming Lab 3:<br>DBMS Lab  | 4              | 60 | - | 3                  | 40  | 60 | 50* | 2     |
| III<br>&<br>IV | III | PR19SB01<br>PD19SB01 | Skill Based Subject<br>Data Analytics – Level I:<br>R-Programming<br>OOSE-Level I:<br>Software Design Tools | 3              | 43 | 2 | 2                  | 25  | 75 | 100 | 4     |
|                |     |                      | <b>Group B - Allied III</b>   |                |    |   |                    |     |    |     |       |
| III            | III | TH20A13              | Allied A3: Optimization Techniques  | 6              | 86 | 4 | 3                  | 40  | 60 | 100 | 5     |
|                | IV  | NM14VHR              | Foundation Course:<br>Value Education and<br>Human Rights   | 2              | 26 | 4 | -                  | 100 | -  | 100 | 2     |
| III<br>&<br>IV | IV  | JOB2026              | Job Oriented Course:<br>Amazon Web Services   | -              | -  | - | 3                  | -   | -  | -   | Grade |
|                |     |                      | <b>Group A - Core</b>   |                |    |   |                    |     |    |     |       |
| IV             | III | CS19C07              | Core 7: Data Mining   | 5              | 71 | 4 | 3                  | 40  | 60 | 100 | 4     |

|                |     |                               |   |   |    |   |   |     |    |     |       |
|----------------|-----|-------------------------------|---|---|----|---|---|-----|----|-----|-------|
|                | III | CS19C08                       | Core 8: Computer Networks   | 5 | 71 | 4 | 3 | 40  | 60 | 100 | 4     |
|                | III | CS19C09                       | Core 9: Python Programming  | 5 | 71 | 4 | 3 | 40  | 60 | 100 | 4     |
|                | III | CS20CP4                       | Programming Lab 4:<br>Python Programming<br>and Bioinformatics Lab  | 4 | 60 | - | 3 | 40  | 60 | 50* | 3     |
| III<br>&<br>IV | III | PR19SBP1<br>PD19SBP1          | Skill Based Subject<br>Data Analytics-Practical I:<br>R-Programming<br>OOSE-Practical I:<br>Software Design Tools | 3 | 45 | - | 2 | 40  | 60 | 100 | 2     |
|                |     |                               | <b>Group B - Allied IV</b>  |   |    |   |   |     |    |     |       |
| IV             | III | BP19A05<br>PD20A01<br>PM20A02 | Allied A4<br>Paper I: Business Accounting<br>Paper II: Digital Marketing<br>Paper III: M-Commerce                 | 6 | 86 | 4 | 3 | 40  | 60 | 100 | 5     |
|                | IV  | NM10EVS                       | Foundation Course:<br>Environmental Studies   | 2 | 26 | 4 | - | 100 | -  | 100 | 2     |
|                | V   |                               | NSS/NCC/YRC/Sports& Games   | - | -  | - | - | -   | -  | 100 | 1     |
|                |     | COM15SER                      | Community Oriented Service  | - | -  | - | - | -   | -  | -   | Grade |

\* 100 Marks Converted into 50 Marks.

\*\* Outside Regular Class Hours.

\*The credits are applicable to candidates who take up the advanced level course exam.

### Bloom's Taxonomy based Assessment Pattern

Continuous Internal (CIA I & II): Assessment: 50 Marks

| Bloom's Category        | Section                   | Marks | Word Limit           | Total |
|-------------------------|---------------------------|-------|----------------------|-------|
| Remember (K1)           | A - 5 X 2 Marks           | 10    | One or two sentences | 50    |
| Understand (K2)         | B - 4 X 5 Marks           | 20    | V250 words           |       |
| Apply, Analyze (K3, K4) | C - 2 out of 3 X 10 Marks | 20    | 500 words            |       |

End Semester Examination: 100 Marks

| Bloom's Category  | Section                  | Word Limit           | Marks | Total |
|---|--------------------------|----------------------|-------|-------|
| Remember (K1)<br>Understand (K1)<br>Apply, Analyze (K3, K4) | A-11 out of 13 X 2 Marks | One or two sentences | 22    | 100   |
|   | B - 5 out of 7 X 6Marks  | 300 words            | 30    |       |
|   | C - 4 out of 6 X 12Marks | 600 - 800 words      | 48    |       |

### Weightage Assigned to Various Components of Continuous Internal Assessment

#### Theory

|                      | CIA I | CIA II | Model Exam | Assignment/Class Notes | Seminar | Quiz | Class Participation | Library Usage | Attendance | Max. Marks |
|----------------------|-------|--------|------------|------------------------|---------|------|---------------------|---------------|------------|------------|
| Core / Allied        | 5     | 5      | 6          | 4                      | 5       | 4    | 5                   | 3             | 3          | 40         |
| SBS                  | 5     | 5      | 15         | -                      | -       | -    | -                   | -             | -          | 25         |
| ALC                  |       | 10     | 15         | -                      | -       | -    | -                   | -             | -          | 25         |
| Information Security | 40    | 40     |            | 10                     |         | 10   |                     |               |            | 100        |

### Rubrics Assessment Tool

Assignment Maximum - 20 Marks (Converted to 4 marks) - Scale 4 to 1

| Criteria              | 4 Marks                       | 3 Marks                        | 2 Marks                          | 1 Mark                   |
|-----------------------|-------------------------------|--------------------------------|----------------------------------|--------------------------|
| Focus Purpose         | Clear                         | Shows awareness                | Shows little awareness           | No awareness             |
| Main idea             | Clearly presents a main idea. | Main idea supported throughout | Vague sense                      | No main idea             |
| Organization: Overall | Well planned                  | Good overall organization      | There is a sense of organization | No sense of organization |

|                                    |   |  |   |                    |
|------------------------------------|---|--|---|--------------------|
| <b>Content</b>                     | Exceptionally well presented                                | Well presented                                 | Content is sound                            | Not good           |
| <b>Style: Details and Examples</b> | Large amounts of specific examples and detailed description | Some use of examples and detailed descriptions | Little use of specific examples and details | No use of examples |

**Seminar Maximum - 20 Marks (Converted to 4 marks) - Scale 4 to 1**

| <b>Criteria</b>                    | <b>4 Marks</b>  | <b>3 Marks</b>                                 | <b>2 Marks</b>                              | <b>1 Mark</b>            |
|------------------------------------|---|--|---|--------------------------|
| <b>Focus Purpose</b>               | Clear   | Shows awareness                                | Shows little awareness                      | No awareness             |
| <b>Main idea</b>                   | Clearly presents a main idea.                               | Main idea supported throughout                 | Vague sense                                 | No main idea             |
| <b>Organization: Overall</b>       | Well planned  | Good overall organization                      | There is a sense of organization            | No sense of organization |
| <b>Content</b>                     | Exceptionally well presented                                | Well presented                                 | Content is sound                            | Not good                 |
| <b>Style: Details and Examples</b> | Large amounts of specific examples and detailed description | Some use of examples and detailed descriptions | Little use of specific examples and details | No use of examples       |

**Class Participation Maximum - 20 Marks (Converted to 5 marks) - Scale 5 to 1**

| <b>Criteria</b>                     | <b>5 Marks</b>  | <b>4 Marks</b>   | <b>3 Marks</b>   | <b>2 Marks</b>  | <b>1 Mark</b>  |
|-------------------------------------|---|--|--|---|--|
| <b>Level of Engagement in Class</b> | Student proactively contributes to class by offering ideas and asks questions more than once per class. | Student proactively contributes to class by offering ideas and asks questions once per class | Student contributes to class and asks questions occasionally | Student rarely contributes to class by offering ideas and asking no questions | Student never contributes to class by offering ideas |

|                         |   |   |  |  |  |
|-------------------------|---|---|--|--|--|
| <b>Listening Skills</b> | Student listens when others talk, both in groups and in class. Student incorporates or builds off of the ideas of others. | Student listens when others talk, both in groups and in class.      | Student listens when others talk in groups and in class occasionally     | Student does not listen when others talk, both in groups and in class. | Student does not listen when others talk, both in groups and in class. Student often interrupts when others speak. |
| <b>Behavior</b>         | Student almost never displays disruptive behavior during class  | Student rarely displays disruptive behavior during class            | Student occasionally displays disruptive behavior during class           | Student often displays disruptive behavior during class                | Student almost always displays disruptive behavior during class  |
| <b>Preparation</b>      | Student is almost always prepared for class with required class materials   | Student is usually prepared for class with required class materials | Student is occasionally prepared for class with required class materials | Student is rarely prepared for class with required class materials     | Student is almost never prepared for class.  |

## Quiz

**Maximum – 20 Marks (Converted to 4 marks)**



**MAPPING OF POs WITH COs**

| <b>COURS<br/>E</b>        | <b>PROGRAMME OUTCOMES</b> |            |            |            |            |
|---------------------------|---------------------------|------------|------------|------------|------------|
|                           | <b>PO1</b>                | <b>PO2</b> | <b>PO3</b> | <b>PO4</b> | <b>PO5</b> |
| <b>COURSE 1 - PP20C01</b> |                           |            |            |            |            |
| <b>CO1</b>                | S                         | S          | M          | M          | S          |
| <b>CO2</b>                | S                         | S          | M          | M          | M          |
| <b>CO3</b>                | S                         | S          | M          | M          | M          |
| <b>CO4</b>                | S                         | S          | M          | S          | S          |
| <b>CO5</b>                | S                         | S          | M          | S          | M          |
| <b>COURSE2- CS20CP1</b>   |                           |            |            |            |            |
| <b>CO1</b>                | S                         | M          | S          | M          | M          |
| <b>CO2</b>                | S                         | S          | M          | M          | S          |
| <b>CO3</b>                | S                         | M          | M          | S          | S          |
| <b>CO4</b>                | S                         | S          | M          | M          | M          |
| <b>CO5</b>                | S                         | S          | S          | M          | S          |
| <b>COURSE 3 - CS20C02</b> |                           |            |            |            |            |
| <b>CO1</b>                | S                         | S          | M          | S          | S          |
| <b>CO2</b>                | S                         | S          | S          | S          | M          |
| <b>CO3</b>                | S                         | M          | S          | S          | S          |
| <b>CO4</b>                | S                         | M          | S          | S          | S          |
| <b>CO5</b>                | S                         | S          | S          | S          | S          |

| <b>COURSE 4 - CS20C03</b> |   |   |   |   |   |
|---------------------------|---|---|---|---|---|
| <b>CO1</b>                | S | M | S | S | S |
| <b>CO2</b>                | S | S | S | M | S |
| <b>CO3</b>                | M | M | S | M | S |
| <b>CO4</b>                | S | S | S | M | S |
| <b>CO5</b>                | S | S | S | S | M |
| <b>COURSE 5 – CS20CP2</b> |   |   |   |   |   |
| <b>CO1</b>                | S | M | S | S | S |
| <b>CO2</b>                | S | S | S | M | S |
| <b>CO3</b>                | M | M | S | M | S |
| <b>CO4</b>                | S | S | S | M | S |
| <b>CO5</b>                | S | S | S | S | M |
| <b>COURSE 6 - CS19C04</b> |   |   |   |   |   |
| <b>CO1</b>                | S | M | M | M | S |
| <b>CO2</b>                | S | S | M | M | S |
| <b>CO3</b>                | S | S | S | S | M |
| <b>CO4</b>                | S | S | S | S | M |
| <b>CO5</b>                | S | S | M | S | M |

| <b>COURSE 7 - CS19C05</b>   |   |   |   |   |   |
|-----------------------------|---|---|---|---|---|
| <b>CO1</b>                  | M | S | S | S | S |
| <b>CO2</b>                  | S | S | S | M | S |
| <b>CO3</b>                  | M | S | S | M | S |
| <b>CO4</b>                  | S | M | S | M | M |
| <b>CO5</b>                  | M | M | S | S | S |
| <b>COURSE 8 – PDB2003</b>   |   |   |   |   |   |
| <b>CO1</b>                  | M | S | M | S | M |
| <b>CO2</b>                  | S | M | S | S | M |
| <b>CO3</b>                  | M | S | S | M | S |
| <b>CO4</b>                  | S | M | M | S | M |
| <b>CO5</b>                  | M | S | S | M | S |
| <b>COURSE 9 - CS20CP3</b>   |   |   |   |   |   |
| <b>CO1</b>                  | M | S | S | S | S |
| <b>CO2</b>                  | S | M | S | M | S |
| <b>CO3</b>                  | S | S | M | S | S |
| <b>CO4</b>                  | M | S | S | S | M |
| <b>CO5</b>                  | S | M | S | M | S |
| <b>COURSE 10 - PR19SB01</b> |   |   |   |   |   |
| <b>CO1</b>                  | S | M | S | M | S |
| <b>CO2</b>                  | S | S | S | M | M |
| <b>CO3</b>                  | S | S | M | S | M |
| <b>CO4</b>                  | S | S | M | S | S |

|                            |   |   |   |   |   |
|----------------------------|---|---|---|---|---|
| <b>CO5</b>                 | S | S | M | S | M |
| <b>COURSE 11- PD19SB01</b> |   |   |   |   |   |
| <b>CO1</b>                 | S | M | S | M | S |
| <b>CO2</b>                 | M | S | S | S | M |
| <b>CO3</b>                 | S | M | M | S | S |
| <b>CO4</b>                 | S | S | M | M | S |
| <b>CO5</b>                 | S | S | S | S | M |
| <b>COURSE 12- CS19C07</b>  |   |   |   |   |   |
| <b>CO1</b>                 | S | M | S | S | M |
| <b>CO2</b>                 | S | M | S | S | M |
| <b>CO3</b>                 | M | M | S | M | M |
| <b>CO4</b>                 | S | S | M | S | S |
| <b>CO5</b>                 | S | S | S | S | S |
| <b>COURSE 13 - CS19C08</b> |   |   |   |   |   |
| <b>CO1</b>                 | S | M | M | M | M |
| <b>CO2</b>                 | S | S | M | M | S |
| <b>CO3</b>                 | S | S | M | M | S |
| <b>CO4</b>                 | S | S | M | M | S |
| <b>CO5</b>                 | S | S | S | S | S |
| <b>COURSE 14 - CS19C09</b> |   |   |   |   |   |
| <b>CO1</b>                 | S | M | M | S | S |
| <b>CO2</b>                 | S | S | S | S | M |
| <b>CO3</b>                 | S | S | S | S | S |
| <b>CO4</b>                 | S | S | S | S | S |

|                            |   |   |   |   |   |
|----------------------------|---|---|---|---|---|
| <b>CO5</b>                 | S | S | S | S | S |
| <b>COURSE 15 - CS20CP4</b> |   |   |   |   |   |
| <b>CO1</b>                 | S | S | S | S | S |
| <b>CO2</b>                 | S | S | S | S | M |
| <b>CO3</b>                 | S | S | M | S | S |
| <b>CO4</b>                 | S | S | M | S | S |
| <b>CO5</b>                 | S | M | S | S | S |

| Course Number | Course Name      | Category | L  | T | P | Credit |
|---------------|------------------|----------|----|---|---|--------|
| PP20C01       | Programming in C | Theory   | 56 | 4 | - | 4      |

### Preamble

This course introduces fundamental concepts such as arrays, structures. It covers concepts such as arrays, pointers and file handling methods. It provides technical skills to design and develop various applications.

### Course Outcomes

On the successful completion of the course, students will be able to

| CO Number | CO Statement  | Knowledge Level |
|-----------|---|-----------------|
| CO1       | Identify the logic behind the execution of various applications | K1              |
| CO2       | Understand the concepts of C programming                        | K2              |
| CO5       | Analyze and discover bugs in the program                        | K3              |
| CO4       | Develop an application using memory management functions.       | K3              |
| CO5       | Apply the concepts to solve a real-time problem                 | K3              |

### Mapping with Programme Outcomes

| COs | PO1 | PO2 | PO3 | PO4 | PO5 |
|-----|-----|-----|-----|-----|-----|
| CO1 | S   | S   | M   | M   | S   |
| CO2 | S   | S   | M   | M   | M   |
| CO3 | S   | S   | M   | M   | M   |
| CO4 | S   | S   | M   | S   | S   |
| CO5 | S   | S   | M   | S   | M   |

S- Strong; M-Medium; L-Low.

**Syllabus**

- Unit I** **12 Hrs**  
Overview of C - Character set - C tokens - keyword & identifiers - constants - variables - data types - declarations of variables – arithmetic, relational, logical, assignment, conditional, bit wise, special, increment and decrement operators - arithmetic expressions - evaluation of expression - operator precedence & associatively - mathematical functions - reading & writing a character - formatted input and output.
- Unit II** **11 Hrs**  
Decision statements: If, if else, switch, break, continue - the?: operator - the GOTO statement. – Loop Control Statements: Introduction – for, nested for loops – while, do-while statements – Arrays: one-dimensional - two dimensional - multidimensional arrays.
- Unit III** **11 Hrs**  
Character string handling - declaring and initializing string variables - reading strings from terminal - writing strings to screen - string handling functions - user-defined functions: Need for user defined functions – types of functions: calling a function category of functions - no arguments and no return values - arguments but no return values - arguments with return values – recursion.
- Unit IV** **11 Hrs**  
Structure definition: structure initialization - comparison of structure variables - arrays of structures - arrays within structures. Pointers: understanding pointers - accessing the address of a variable - declaring and initializing pointers - accessing a variable through its pointers - pointers and arrays - pointers and character strings - pointers and functions.
- Unit V** **11 Hrs**  
File management in C: defining and opening a file - closing file - I/O operations on files - error handling during I/O operations - random access to files - command line arguments.

**Text Book**

| <b>S. No</b> | <b>Author</b>   | <b>Title of the Book</b> | <b>Publisher</b>  | <b>Year of Publication</b>    |
|--------------|-----------------|--------------------------|-------------------|-------------------------------|
| <b>1</b>     | E. Balagurusamy | Programming In ANSI C    | Tata Mc Graw Hill | 7 <sup>th</sup> Edition, 2017 |

## Reference Books

| S. No | Author             | Title of the Book                 | Publisher                                    | Year of Publication            |
|-------|--------------------|-----------------------------------|--|--------------------------------|
| 1     | Byron Gottfried    | Programming with C                | Tata McGraw Hill                             | 3 <sup>rd</sup> Edition,2013   |
| 2     | V. Rajaraman       | Computer Programming in C         | Prentice Hall of India Pvt Ltd               | 1 <sup>st</sup> Edition,2004   |
| 3     | Smarajit Ghosh     | Programming in C                  | Prentice Hall of India Pvt Ltd               | 1 <sup>st</sup> Edition,2004   |
| 4     | Yashwvant Kanetkar | Let us C                          | BPB Publications                             | 13 <sup>th</sup> Edition, 2014 |
| 5     | Martin J. Gentile  | An Easy Guide to Programming in C | Create Space Independent Publishing Platform | 2 <sup>nd</sup> Edition, 2012  |

## Pedagogy

- Lectures, Group discussions, Demonstrations, Case studies.

## Course Designer

- Dr. R..Vishnupriya



| Course Number | Course Name       | Category  | L | T | P  | Credit |
|---------------|-------------------|-----------|---|---|----|--------|
| CS20CP1       | C Programming Lab | Practical | - | - | 45 | 2      |

### Preamble

This course introduces the concepts of C programming. It provides technical skill, basic concepts like control statements, pointers, structures and file handling techniques.

### Course Outcomes

On the successful completion of the course, students will be able to

| CO Number | CO Statement  | Knowledge Level |
|-----------|---|-----------------|
| CO1       | Recall the mathematical functions while creating a program        | K1              |
| CO2       | Understand the fundamental programming concepts                   | K2              |
| CO5       | Illustrate the programming technique to analyze software problems | K2              |
| CO4       | Apply the concepts to find solution for the problems              | K3              |
| CO5       | Design and develop the simple application                         | K3              |

### Mapping with Programme Outcomes

| COs | PO1 | PO2 | PO3 | PO4 | PO5 |
|-----|-----|-----|-----|-----|-----|
| CO1 | S   | M   | S   | M   | M   |
| CO2 | S   | S   | M   | M   | S   |
| CO3 | S   | M   | M   | S   | S   |
| CO4 | S   | S   | M   | M   | M   |
| CO5 | S   | S   | S   | M   | S   |

**S- Strong; M-Medium; L-Low**

## **C Programming Lab - CS18CP1**

**(45 Hrs)**

### **List of Programs**

- Exercise using different data types
- Exercise using different operators
- Exercise to implement control structures
- Exercise using Loop statements
- Exercise using arrays
- Exercise to explore built-in functions
- Exercise to create user defined function
- Exercise using structures
- Exercise using pointers
- Exercise to work with files

### **Pedagogy**

- Demonstration of working environment / Tools / Software / Program

### **Course Designer**

- Dr. R. Vishnupriya

| Course Number | Course Name                            | Category | L  | T | P | Credit |
|---------------|--|----------|----|---|---|--------|
| CS20C02       | Computer Organization and Architecture | Theory   | 41 | 4 | - | 3      |

### Preamble

This course provides the principles and practices of digital electronics and computer system and also covers the concepts of computer Arithmetic operations, cache mapping techniques and I/O organization. It also provides the various data transfer techniques in digital computer.

### Course Outcomes

On the successful completion of the course, students will be able to

| CO Number | CO Statement  | Knowledge Level |
|-----------|---|-----------------|
| CO1       | Define the functions to simplify the Boolean equations using logic gates.   | K1              |
| CO2       | Discuss the system architecture based on microprocessor.  | K2              |
| CO3       | Understand the functions of the registers and different types of micro-operations.  | K3              |
| CO4       | Illustrate the classification of pipelining and vector processing.  | K3              |
| CO5       | Show the operation of ALU along with the algorithm and implementation of integer and floating-point arithmetic operators. | K3              |

### Mapping with Programme Outcomes

| COs | PO1 | PO2 | PO3 | PO4 | PO5 |
|-----|-----|-----|-----|-----|-----|
| CO1 | S   | S   | M   | S   | S   |
| CO2 | S   | S   | S   | S   | M   |
| CO3 | S   | M   | S   | S   | S   |
| CO4 | S   | M   | S   | S   | S   |
| CO5 | S   | S   | S   | S   | S   |

S- Strong; M-Medium; L-Low.

## Computer Organization and Architecture - CS20C02

(41 Hrs)

### Syllabus

#### Unit I

9Hrs

Data Representation: Data types - Number systems: Octal & Hexadecimal numbers, Decimal Representation, Alphanumeric representation. Logic Circuits: Gates - AND, OR, NOT, NAND, NOR Gates & Truth tables - Boolean algebra

#### Unit II

8 Hrs

Flip flops: SR, JK, D, T. Karnaugh maps - Product of Sums method- Sum of product method- Don't Care condition - Decoders-Multiplexer - Demultiplexer

#### Unit III

8Hrs

Register Transfer and Micro Operations: Register transfer language - Register Transfer-Bus and memory transfers - Arithmetic Micro operations-Logic micro-operations - Shift micro-operation. Instruction format: Three address instruction-Two address instruction-One address instruction-Zero address instruction

#### Unit IV

8 Hrs

Addressing modes - Data transfer and manipulation - Program Control. Computer Arithmetic: Addition and Subtraction

#### Unit V

8 Hrs

Input /output organization: Input output interface - Asynchronous data transfer - DMA. Memory organization: Memory hierarchy - Main memory - Cache memory - Virtual memory

### Text Book

| S. No | Author        | Title of the Book            | Publisher         | Year of Publication           |
|-------|---------------|------------------------------|-------------------|-------------------------------|
| 1     | M Morris Mano | Computer System Architecture | Pearson Education | 3 <sup>rd</sup> Edition, 2007 |

### Reference Books

| S. No | Author                                  | Title of the Book                                  | Publisher         | Year of Publication              |
|-------|---|--|-------------------|----------------------------------|
| 1     | Donald P. Leach,<br>Albert Paul Malvino | Digital Principles and Applications                | Tata McGraw- Hill | 5 <sup>th</sup> Edition,<br>2003 |
| 2     | John .L. Hennessy                       | Computer Architecture -<br>A Quantitative approach | Elsevier          | 2 <sup>nd</sup> Edition,<br>2011 |

|   |                   |   |                        |      |
|---|-------------------|---|------------------------|------|
| 3 | William Stallings | Computer Organization and Architecture: Designing for Performance | Technical Publications | 2010 |
|---|-------------------|---|------------------------|------|

**Pedagogy**

- Lectures, Group discussions, Demonstrations

**Course Designer**

- Mrs. V. Deepa

| Course Number | Course Name      | Category | L  | T | P | Credit |
|---------------|------------------|----------|----|---|---|--------|
| CS20C03       | Java Programming | Theory   | 71 | 4 | - | 5      |

### Preamble

The course is an expository of the object-oriented programming methodology with emphasis on software design and code reuse as its core objectives. Language elements include loops, arrays, input/output structures, events, exceptions, and threads. It aims to develop the student's logical, critical thinking and problem-solving skills on programming basics

### Course Outcomes

On the successful completion of the course, students will be able to

| CO Number | CO Statement   | Knowledge Level |
|-----------|--|-----------------|
| CO1       | Define the basic Java language syntax and semantics to write Java programs and use concepts such as variables, conditional and iterative execution methods | K1              |
| CO2       | Describe the fundamentals of object-oriented programming including defining classes, objects, invoking methods   | K2              |
| CO3       | Apply the principles of inheritance, packages and interfaces   | K3              |
| CO4       | Use exceptions, applets, graphics programming for real world problems  | K3              |
| CO5       | Demonstrate the working features of files  | K3              |

### Mapping with Programme Outcomes

| COs | PO1 | PO2 | PO3 | PO4 | PO5 |
|-----|-----|-----|-----|-----|-----|
| CO1 | S   | M   | S   | S   | S   |
| CO2 | S   | S   | S   | M   | S   |
| CO3 | M   | M   | S   | M   | S   |
| CO4 | S   | S   | S   | M   | S   |
| CO5 | S   | S   | S   | S   | M   |

S- Strong; M-Medium; L-Low.

## Java Programming - CS20C03

(71 Hrs)

### Syllabus

#### Unit - I

14 Hrs

JAVA Evolution: History - Features - Java differs from C and C++ -Java and Internet - Java and WWW - Web Browsers. Overview of Java Language: Introduction - Simple Java program – Java Program Structure - **Java Tokens**- Java Statements - Java Virtual Machine.

#### Unit - II

15 Hrs

Constants, Variables and Data Types: Constants – **Variables** - Data types - **Operators and expressions-Decision making and Branching: Simple If Statement - the IF...Else statement, Nesting of If...Else - The Else if ladder** - The Switch Statement, The?: Operator, Decision making and looping: The While statement, the do Statement - The for Statement- Jumps in loops - labeled loops - Classes, Objects and Methods.

#### Unit - III

14 Hrs

**Arrays**, Strings and Vectors – Interfaces: Multiple Inheritance – Packages: Putting classes together.

#### Unit - IV

14 Hrs

Managing Errors and Exceptions – Applet Programming – Graphics programming: The Graphics class-Lines and rectangles-Circles and ellipses - Drawing arcs - **Drawing polygons**.

#### Unit -V

14 Hrs

Files: Introduction – concept of streams – Stream classes – Using stream – I/O classes – File class – I/O Exceptions – creation of files – **Reading / Writing characters/ Bytes** – Handling primitive data types.

### Text Book

| S. No | Author           | Title of the Book                | Publisher                | Year of Publication |
|-------|------------------|----------------------------------|--------------------------|---------------------|
| 1     | E. Balaguruswamy | Programming with JAVA – A Primer | McGraw Hill Professional | 2015                |

### Reference Books

| S. No | Author          | Title of the Book            | Publisher   | Year of Publication |
|-------|-----------------|------------------------------|-------------|---------------------|
| 1     | Herbert Schildt | Java: The complete Reference | McGraw Hill | 2017                |

| Course Number | Course Name | Category | L | T | P | Credit |
|---------------|-------------|----------|---|---|---|--------|
|---------------|-------------|----------|---|---|---|--------|

|   |                                |   |                   |  |  |      |
|---|--------------------------------|---|-------------------|--|--|------|
|   |                                |   | Professional      |  |  |      |
| 2 | Robert Sedgewick & Kevin Wayne | Introduction to Programming in Java             | Addison Wesley    |  |  | 2017 |
| 3 | Y. Daniel Liang                | Introduction to Java Programming, Brief Version | Pearson Education |  |  | 2017 |

**Note:**

**Flipped mode learning topics are highlighted**

| Unit     | Topic   | Activity      | Web Resources  |
|----------|---|---------------|--|
| Unit I   | Java tokens   | Assignment    | <ul style="list-style-type: none"> <li>• <a href="http://www.javapoint.com">www.javapoint.com</a></li> <li>• <a href="http://www.tutorialspoint.com">www.tutorialspoint.com</a></li> <li>• <a href="http://www.tutorialdost.com">www.tutorialdost.com</a></li> </ul> |
| Unit II  | Variables - Operators and expressions-Decision making and Branching: Simple If Statement, the IF...Else statement, Nesting of If...Else, The Else if ladder | Debugging     |  |
| Unit III | Arrays  | Seminar       |  |
| Unit IV  | Drawing Polygons  | Demonstration |  |
| Unit V   | Reading / Writing characters/ Bytes   | Debugging     |  |

**Course Activity**

**Pedagogy**

- Lectures, Group discussions, Demonstrations

**Course Designer**

- Dr. J. Viji Gripsy



|                |   |           |   |   |    |   |
|----------------|---|-----------|---|---|----|---|
| <b>CS20CP2</b> | <b>Java Programming and Bio Informatics Lab</b> | Practical | - | - | 75 | 3 |
|----------------|---|-----------|---|---|----|---|

### Preamble

This course focuses to equip students with adequate high-level object-oriented programming techniques required for successful design, development, and deployment of today's complex software systems. Implement object oriented programming concepts. Create package and interfaces in a Java program. Use graphical user interface in Java programs and create applets. To align the sequence data using various tools in Bioinformatics.

### Course Outcomes

On the successful completion of the course, students will be able to

| <b>CO Number</b> | <b>CO Statement</b>   | <b>Knowledge Level</b> |
|------------------|---|------------------------|
| <b>CO1</b>       | Understand the enabling technologies for building internet applications | K1                     |
| <b>CO2</b>       | Illustrate the object-oriented technique to analyze software problems   | K2                     |
| <b>CO3</b>       | Apply the principles of inheritance, packages and interfaces            | K3                     |
| <b>CO4</b>       | Implement the multithreading, exception handling concepts               | K3                     |
| <b>CO5</b>       | Apply programming skills to experiment protein sequence                 | K3                     |

### Mapping with Programme Outcomes

| <b>COs</b> | <b>PO1</b> | <b>PO2</b> | <b>P03</b> | <b>P04</b> | <b>PO5</b> |
|------------|------------|------------|------------|------------|------------|
| <b>CO1</b> | S          | M          | S          | S          | S          |
| <b>CO2</b> | S          | S          | S          | M          | S          |
| <b>CO3</b> | M          | M          | S          | M          | S          |
| <b>CO4</b> | S          | S          | S          | M          | S          |
| <b>CO5</b> | S          | S          | S          | S          | M          |

S- Strong; M-Medium; L-Low

## **Java Programming and Bio Informatics Lab - CS20CP2**

**(75 Hrs)**

### **List of Programs**

- Exercises using classes and objects
- Exercises using an array
- Exercises using a string
- Exercises using Inheritance
- Exercises using multiple inheritance using interfaces
- Exercises to implement Exception Handling
- Exercises using applets
- Explore the sitemap of NCBI and PUBMED and find the official gene symbol, alias name, chromosome number and ID for a particular sequence
- Retrieve the Genbank entry with an accession number AF375082 and save the sequence in FASTA format
- Retrieve Protein sequences from Protein Data Bank (PDB) and analyze the primary, secondary and tertiary protein structure using tools
- Retrieve nucleotide sequences and perform local alignment and global alignment using EMBOSS

### **Pedagogy**

- Demonstration of working environment / Tools / Software / Program

### **Course Designer**

- Dr. J. Viji Gripsy

| Course Number | Course Name      | Category | L  | T | P | Credit |
|---------------|------------------|----------|----|---|---|--------|
| CS19C04       | OPERATING SYSTEM | III      | 71 | 4 | - | 4      |

### Preamble

This course provides the basic operating system structure, process management, synchronization and CPU scheduling. The course is designed to cover deadlock, storage management file system, interface, I/O systems, virtual machines and distributed systems.

### Course Outcomes

On the successful completion of the course, students will be able to

| CO Number | CO Statement  | Knowledge Level |
|-----------|---|-----------------|
| CO1       | Recognize the basic concepts of operating system  | K1              |
| CO2       | Understand the process and thread concepts  | K2              |
| CO3       | Distinguish the concepts of deadlocks and storage management in operating system concepts | K3              |
| CO4       | Apply various file system implementation and optimization techniques using files          | K3              |
| CO5       | Illustrate the virtual machine and distributed system in various fields.                  | K3              |

### Mapping with Programme Outcomes

| COs | PO1 | PO2 | PO3 | PO4 | PO5 |
|-----|-----|-----|-----|-----|-----|
| CO1 | S   | M   | M   | M   | S   |
| CO2 | S   | S   | M   | M   | S   |
| CO3 | S   | S   | S   | S   | M   |
| CO4 | S   | S   | S   | S   | M   |
| CO5 | S   | S   | M   | S   | M   |

S- Strong; M-Medium; L-Low.

## **Operating System -CS19C04**

**(71 Hrs)**

### **Syllabus**

#### **Unit I**

**14 Hrs**

Introduction: What Operating Systems Do - Operating-System Structure - Operating System operations. Operating System Structures: Operating System Services - User and Operating System Interface - System Calls - System Programs - Operating System Design and Implementation - Operating System Debugging - Operating System Generation - Types of System Calls.

#### **Unit II**

**15 Hrs**

Process Management: Process Concept - Process Scheduling - Operations on Processes. Threads: Overview - Multicore Programming - Multithreading Models. Process Synchronization: Synchronization Hardware - Mutex Locks - Semaphores. CPU Scheduling: Basic Concepts - Scheduling Criteria - Scheduling Algorithms - Thread Scheduling.

#### **Unit III**

**14 Hrs**

Deadlock: System Model - Deadlock Characterization - Methods for Handling Deadlocks - Deadlock Prevention- Deadlock Avoidance- Deadlock Detection- Recovery from Deadlock. Storage Management: Overview of Mass Storage Structure – Disk Structure - Disk Attachment - Disk Scheduling - Disk Management- Swap Space Management -RAID Structure.

#### **Unit IV**

**14 Hrs**

File System Interface: File Concept- Access Methods -Directory and Disk Structure- File-System Mounting - File Sharing – Protection. I/O Systems: Overview- I/O Hardware - Application I/O Interface - Kernel I/O Subsystem.

#### **Unit V**

**14 Hrs**

Virtual Machines: Overview - Benefits and Features- Building Blocks -Types of Virtual Machines and their implementations - Virtualization and Operating System Components - Examples Distributed Systems: Advantages of Distributed Systems - Types of Network based Operating Systems. Case Studies: XDS-940896- THE897-RC4000897- CTSS898-MULTICS899 IBMOS/360-TOPS-20-CP/M and MS/DOS901 Macintosh Operating System and Windows Mach.

## Text Book

| S. No | Author                 | Title of the Book | Publisher       | Year of Publication            |
|-------|------------------------|-------------------|-----------------|--------------------------------|
| 1     | Abraham G Silberschatz | Operating System  | Wiley Publisher | 10 <sup>th</sup> Edition, 2017 |

## Reference Books

| S. No | Author   | Title of the Book         | Publisher              | Year of Publication           |
|-------|--|---------------------------|------------------------|-------------------------------|
| 1     | Andrew.S. Tannenbaum                           | Modern operating System   | Pearson Education      | 2014                          |
| 2     | Abraham Silberschatz, Peter B.Galvin, GregGane | Operating System Concepts | Wiley Global Education | 9 <sup>th</sup> Edition, 2012 |

## Pedagogy

- Lectures, Demonstration, Case studies.

## Course Designer

- Mrs. N. Deepa

| Course Number | Course Name     | Category | L  | T | P | Credit |
|---------------|-----------------|----------|----|---|---|--------|
| CS19C05       | DATA STRUCTURES | III      | 71 | 4 | - | 4      |

### Preamble

This course covers the basic concepts, terminologies in data structure. It provides the data representation, storage and retrieval also gives the sorting and searching techniques and implementation of the algorithm.

### Course Outcomes

On the successful completion of the course, students will be able to

| CO Number | CO Statement   | Knowledge Level |
|-----------|--|-----------------|
| CO1       | Recognize the problems where stacks, queues and dequeue are used in data structures.                                       | K1              |
| CO2       | Explain and implement Insertion Sort, Selection sort, Radix sort, Merge sort, Quick sort, Binary Search and Linear Search. | K2              |
| CO3       | Describe the abstract data type list as a linked list using node and reference pattern                                     | K2              |
| CO4       | Illustrate the performance of basic linear data structures.  | K3              |
| CO5       | Interpret the concept of files, queries and sequential organization.   | K3              |

### Mapping with Programme Outcomes

| COs | PO1 | PO2 | PO3 | PO4 | PO5 |
|-----|-----|-----|-----|-----|-----|
| CO1 | M   | S   | S   | S   | S   |
| CO2 | S   | S   | S   | M   | S   |
| CO3 | M   | S   | S   | M   | S   |
| CO4 | S   | M   | S   | M   | M   |
| CO5 | M   | M   | S   | S   | S   |

S- Strong; M-Medium; L-Low.

**Data Structures – CS19C05****(71 Hrs)****Syllabus****Unit I****14 Hrs**

Introduction and Overview: Introduction - Basic Terminology; Elementary Data Organization - Data structures - Data structure operations - Algorithms: Complexity, Time- Space Trade-off. Preliminaries: Algorithmic Notation - Control Structures- Variables, Data Types. Arrays, Records and Pointers: Introduction - Linear Arrays - Representation of Linear Arrays in Memory - Traversing Linear array - Inserting and Deleting - Multidimensional Array

**Unit II****14 Hrs**

Stack, Queues, Recursion: Introduction – Stacks - Array Representation of Stacks - Linked Representation of Stacks - Arithmetic Expressions - Polish Notation - Recursion- Towers of Hanoi - Implementation of Recursive Procedures by Stacks – Queues - Linked Representation of Queues – Dequeue – Priority Queues

**Unit III****15 Hrs**

Linked Lists: Introduction - Linked Lists - Representation of Linked Lists in Memory- Traversing a Linked List - Memory Allocation-Garbage Collection - Deletion from a Linked List - Header Linked Lists

**Unit IV****14 Hrs**

Trees: Introduction - Binary Trees - Representing Binary Trees in Memory-traversing binary trees-Graphs: Terminology and Representations –Sequential Representation of Graphs-Adjacency Matrix, Path Matrix

**Unit V****14 Hrs**

Sorting and Searching: Introduction – Sorting - Insertion Sort - Selection Sort - Merging - Merge Sort - Radix Sort -Bubble Sort-Quick Sort. Searching and Data Modification – Hashing- Linear Search – Binary Search

**Text Book**

| <b>S. No</b> | <b>Author</b>     | <b>Title of the Book</b> | <b>Publisher</b>          | <b>Year of Publication</b>                   |
|--------------|-------------------|--------------------------|---------------------------|--|
| 1            | Seymour Lipschutz | Data Structures          | Tata Mc-Graw Hill Company | 5 <sup>th</sup> Edition 2009, Reprinted 2014 |

## Reference Books

| S. No | Author                             | Title of the Book                       | Publisher   | Year of Publication     |
|-------|------------------------------------|---|---|-------------------------|
| 1     | Ellis Horowitz<br>Sartaj Sahni     | Fundamentals of<br>Data Structures      | Galgotia Book<br>Source                               | 2003,<br>Reprinted 2014 |
| 2     | Harry Hariom<br>Choudhary          | Data Structures                         | Create Space<br>Independent<br>Publishing<br>Platform | 2014                    |
| 3     | A. K. Sharma                       | Data Structures<br>using C              | Pearson<br>Education                                  | 2014                    |
| 4     | Rajdew Tiwari and<br>Nagesh Sharma | Design and<br>Analysis of<br>Algorithms | Pearson<br>Education                                  | 2014                    |

## Pedagogy

- Lectures, Demonstration, Case studies

## Course Designer

- Dr. R. Kavitha



| Course Number | Course Name                 | Category | L  | T | P | Credit |
|---------------|-----------------------------|----------|----|---|---|--------|
| PDB2003       | Database Management Systems | Theory   | 71 | 4 | - | 4      |

### Preamble

This course provides an insight on the basics of database, database design, relational model and querying a database. It also gives an overview of NoSQL databases and storing and accessing data in a key/value database MongoDB.

### Course Outcomes

On the successful completion of the course, students will be able to

| CO Number | CO Statement   | Knowledge Level |
|-----------|--|-----------------|
| CO1       | Define the fundamental elements of database management system                          | K1              |
| CO2       | Differentiate integrity constraints and various query statements                       | K2              |
| CO3       | Classify the different data functions and various join operations                      | K2              |
| CO4       | Demonstrate procedures, cursors, triggers and packages using PL/SQL programming        | K3              |
| CO5       | Analyze the functioning of different types of NoSQL databases and relational databases | K3              |

### Mapping with Programme Outcomes

| COs | PO1 | PO2 | PO3 | PO4 | PO5 |
|-----|-----|-----|-----|-----|-----|
| CO1 | M   | S   | M   | S   | M   |
| CO2 | S   | M   | S   | S   | M   |
| CO3 | M   | S   | S   | M   | S   |
| CO4 | S   | M   | M   | S   | M   |
| CO5 | M   | S   | S   | M   | S   |

S- Strong; M-Medium; L-Low

**Database Management Systems - PDB2003**

**(71 Hrs)**

**Syllabus**

**Unit I****14 Hrs**

Database Concepts: Introduction -Relationships - DBMS -Relational data model - Integrity rules - Theoretical relational languages. Database Design: Data modeling -Dependency -Database design - Normal forms - Dependency diagrams – **Denormalization**.

**Unit II****14 Hrs**

Structured Query Language (SQL): Introduction – DDL - Naming rules and conventions-Data types – Constraints – Creating table- Displaying table information - Altering an existing table– **Dropping, renaming, and truncating table** - Table type. Working with tables: DML - adding anew row/record – updating and deleting existing rows/records - Retrieving data from table - Sorting - CASE structure.

**Unit III****14 Hrs**

Functions and Grouping: **Built-in functions** - Grouping data. Joins and Views: Join -Join types. Views: Views - Creating a view - Removing a view - Altering a view. PL/SQL: Fundamentals-Block structure - comments - **Data types – Other data types - Variable declaration - Assignment operation**.

**Unit IV****14 Hrs**

Control Structures and Embedded SQL: Control structures - Nested blocks - SQL in PL/SQL - **Data manipulation** -Transaction control statements. PL/SQL Cursors: Cursors -Implicit & explicit cursors and attributes - cursor FOR loops - Records - Tables - Procedures -**Functions** –Triggers.

**Unit V****15 Hrs**

An overview of NoSQL - Characteristics of NoSQL – NoSQL storage types - Advantages and Drawbacks - MongoDB Introduction – **Creating database and Dropping database - Creating collection and Dropping collection – Insert, query and update document**.

**Text Books**

| S. No | Author       | Title of the Book             | Publisher | Year of Publication           |
|-------|--------------|-------------------------------|-----------|-------------------------------|
| 1     | Nilesh Shah  | Database Systems Using Oracle | PHI       | 2 <sup>nd</sup> Edition, 2016 |
| 2     | Gaurav Vaish | Getting Started with NoSQL    | Packt     | 2013                          |

**Reference Books**

| S. No | Author        | Title of the Book           | Publisher               | Year of Publication           |
|-------|---------------|-----------------------------|-------------------------|-------------------------------|
| 1     | Rajesh Narang | Database Management Systems | Prentice Hall of India, | 2 <sup>nd</sup> Edition, 2011 |

|   |                                  |                              |                |                              |
|---|----------------------------------|------------------------------|----------------|------------------------------|
| 2 | Pramod Sadalge,<br>Martin Fowler | NoSQL Distilled              | Addison-Wesley | 2012                         |
| 3 | Kristina Chodorow                | MongoDB: Definitive<br>Guide | Oreilly        | 2 <sup>nd</sup> Edition,2015 |

### Pedagogy

- Lecture, Demonstration

**Note: Flipped mode learning topics are highlighted**

### Course Activity

| Unit     | Topic   | Activity         | Web Resources  |
|----------|---|------------------|--|
| Unit I   | Denormalization   | Group Discussion | <ul style="list-style-type: none"> <li>• <a href="https://www.w3schools.com/sql">https://www.w3schools.com/sql</a></li> <li>• <a href="https://www.tutorialspoint.com/sql/">https://www.tutorialspoint.com/sql/</a></li> <li>• <a href="https://livesql.oracle.com">https://livesql.oracle.com</a></li> <li>• <a href="https://beginnersbook.com/2017/09/mongodb-tutorial/">https://beginnersbook.com/2017/09/mongodb-tutorial/</a></li> </ul> |
| Unit II  | Dropping, renaming, and truncating table  | Case Study       |  |
| Unit III | Built-in functions- Data types – Other data types - Variable declaration- Assignment operation                            | Quiz             |  |
| Unit IV  | Data manipulation, Functions  | Seminar          |  |
| Unit V   | Creating database and Dropping database - Creating collection and Dropping collection – Insert, query and update document | Case Study       |  |

### Course Designers

- Dr. S. Karpagavalli
- Dr. R. Kavitha

| Course Number | Course Name | Category  | L | T | P  | Credit |
|---------------|-------------|-----------|---|---|----|--------|
| CS20CP3       | DBMS Lab    | Practical | - | - | 60 | 2      |

### Preamble

The lab course provides a way to explore storing and accessing data in database through query languages and PL/SQL programming language. It enables to experience a NoSQL key/value store database MongoDB.

### Course Outcomes

On the successful completion of the course, students will be able to

| CO Number | CO Statement  | Knowledge Level |
|-----------|---|-----------------|
| CO1       | Understand basic SQL query statements                           | K1              |
| CO2       | Gain knowledge on primary and foreign key constraints           | K2              |
| CO3       | Apply functions and joins on data                               | K3              |
| CO4       | Demonstrate PL/SQL programming on databases                     | K3              |
| CO5       | Differentiate Key/value store database from relational database | K2              |

### Mapping with Programme Outcomes

| COs | PO1 | PO2 | PO3 | PO4 | PO5 |
|-----|-----|-----|-----|-----|-----|
| CO1 | M   | S   | S   | S   | S   |
| CO2 | S   | M   | S   | M   | S   |
| CO3 | S   | S   | M   | S   | S   |
| CO4 | M   | S   | S   | S   | M   |
| CO5 | S   | M   | S   | M   | S   |

S- Strong; M-Medium; L-Low.

**DBMS Lab - CS20CP3**

**(60 Hrs)**

### List of Programs

- Exercise using different data types and operators

- Exercise using integrity constraints
- Exercise to implement built-in functions and views
- Exercise to implement update and alter table
- Exercise to implement PL/SQL table and record
- Exercise to implement splitting and joining the table
- Exercise using Functions
- Exercise using Cursors
- Exercise using Triggers
- Exercise to create and drop database in MongoDB
- Exercise to create and drop collection in MongoDB
- Exercise to insert, query and update document in MongoDB

**Pedagogy**

- Demonstration of working environment / Tools / Software / Program

**Course Designers**

- Dr. S. Karpagavalli
- Dr. R. Kavitha

## **JOB ORIENTED COURSE**

**Title** : Amazon Web Services  
**Course Code** : JOB2026  
**Duration** : 60 Hrs

### **Objective**

This course focuses on basic concepts, key technologies, and strengths of Amazon web services.

**Collaboration:** ICT Academy, Chennai.

### **Syllabus**

**Module 1** : Welcome to AWS Academy Cloud Architecting  
**Module 2** : Designing Your Environment  
**Module 3** : Designing for High Availability I  
**Module 4** : Designing for High Availability II  
**Module 5** : Automating Your Infrastructure  
**Module 6** : Decoupling Your Infrastructure  
**Module 7** : Designing Web-Scale Media  
**Module 8** : Well Architected Framework  
**Module 9** : Well-Architected Pillar 1: Operational Excellence  
**Module 10** : Well-Architected Pillar 2: Security  
**Module 11** : Well-Architected Pillar 3: Reliability  
**Module 12** : Well-Architected Pillar 4: Performance Efficiency  
**Module 13** : Well-Architected Pillar 5: Cost Optimization  
**Module 14** : Troubleshooting  
**Module 15** : Design Patterns and Sample Architectures

**Text Book: Course materials will be provided**

| Course Number | Course Name  | Category | L  | T | P | Credit |
|---------------|--|----------|----|---|---|--------|
| PR19SB01      | Skill Based Subject<br>Data Analytics-Level I: R Programming | III      | 43 | 2 | - | 4      |

### Preamble

This course covers the basics of R programming working environment. It also includes concepts involved in importing data, manipulating data for specific needs, running summary statistics and data visualizations through graphs, charts and plots.

### Course Outcomes

On the successful completion of the course, students will be able to

| CO Number | CO Statement   | Knowledge Level |
|-----------|--|-----------------|
| CO1       | Knowledge on R-Programming environment and libraries   | K1              |
| CO2       | Understand the basics in R programming in terms of constructs, control statements and built-in functions | K2              |
| CO3       | Learn to apply R programming for matrix and vector processing  | K2              |
| CO4       | Reading data from files and analyzing data using R   | K3              |
| CO5       | Enables to visualize data using graphs and chart   | K3              |

### Mapping with Programme Outcomes

| COs | PO1 | PO2 | PO3 | PO4 | PO5 |
|-----|-----|-----|-----|-----|-----|
| CO1 | S   | M   | S   | M   | S   |
| CO2 | S   | S   | S   | M   | M   |
| CO3 | S   | S   | M   | S   | M   |
| CO4 | S   | S   | M   | S   | S   |
| CO5 | S   | S   | M   | S   | M   |

S- Strong; M-Medium; L-Low.

**Data Analytics-Level I: R Programming – PR19SB01****(43 Hrs)****Syllabus****Unit I** **9 Hrs**

Overview of the R Language: Defining the R project, Obtaining R, Generating R codes, Scripts, Comments, Text editors for R, Graphical User Interfaces (GUIs) for R, Packages.

**Unit II** **9 Hrs**

R Objects And Data Structures: Variable classes, Vectors and matrices, Data frames and lists, Array and Factors.

**Unit III** **9 Hrs**

Manipulating Objects in R: Mathematical operations, Decision making, loops, functions and Strings.

**Unit IV** **8 Hrs**

Exploratory Data Analysis: Reading, creating and storing R -CSV file, Excel file, Binary file, XML File -R - Mean, Median, Mode- Regression.

**Unit V** **8Hrs**

Graphical Representation: R-PIE chart – Bar chart – Box plots-Histograms – line graphs - Scatter plots.

**Text Book:** Course materials will be provided

**Reference Books**

| <b>S. No</b> | <b>Author</b>  | <b>Title of the Book</b> | <b>Publisher</b>  | <b>Year of Publication</b> |
|--------------|----------------|--------------------------|-------------------|----------------------------|
| 1            | Jared Lander   | R for everyone           | Pearson Education | 2015                       |
| 2            | Norman Matloff | The Art of R Programming | No Starch Press   | 2011                       |

**Note**

\*During Semester III, Unit - I and Unit - II till Vectors and Matrices.

\*\*During Semester IV in Unit – II from Data Frames, Unit - III, IV and V.

**Pedagogy**

- Lecture, Demonstration
- Course Designer  
Mrs. N. Deepa



| Course Number | Course Name   | Category | L  | T | P | Credit |
|---------------|---|----------|----|---|---|--------|
| PD19SB01      | Skill Based Subject<br>OOSE-Level I: Software Design<br>Tools | III      | 43 | 2 | - | 4      |

### Preamble

This course facilitates to learn various concepts, tools and techniques that are used to design and implement software systems. This course gives a detailed description for developing software by identifying and implementing a set of objects and their interactions to meet the desired objectives.

### Course Outcomes

On the successful completion of the course, students will be able to

| CO Number | CO Statement  | Knowledge Level |
|-----------|---|-----------------|
| CO1       | Knowledge on basic Software engineering methods practices and principles                            | K1              |
| CO2       | Familiar with main components of different diagrams, and the purpose of different modeling diagrams | K1              |
| CO3       | Understand the basic concepts of software development life cycle and modeling techniques            | K2              |
| CO4       | Demonstrate data models, object models, context models and architectural models                     | K3              |
| CO5       | Distinguish between component and deployment diagrams   | K2              |

### Mapping with Programme Outcomes

| COs | PO1 | PO2 | PO3 | PO4 | PO5 |
|-----|-----|-----|-----|-----|-----|
| CO1 | S   | M   | S   | M   | S   |
| CO2 | M   | S   | S   | S   | M   |
| CO3 | S   | M   | M   | S   | S   |
| CO4 | S   | S   | M   | M   | S   |
| CO5 | S   | S   | s   | S   | M   |

S- Strong; M-Medium; L-Low.

**OOSE-Level I: Software Design Tools- PD19SB01****(43 Hrs)****Syllabus****Unit I****9 Hrs**

Introduction to UML: Overview of the UML- Importance of Modeling- Principles of Modeling- Object Oriented Modeling- Conceptual Model of the UML- Architecture- Software Development Life Cycle.

**Unit II****9 Hrs**

Structural Modeling Basic Structural Modeling: Classes- Relationships- Common Mechanisms- and diagrams. Advanced Structural Modeling: Advanced classes- Advanced relationships- Interfaces- Types and Roles- Packages.

**Unit III****9 Hrs**

Class & Object Diagrams: Terms and Concepts- Construction of a Class diagram- Common Modeling Techniques for Class & Object Diagrams-Interactions- Interaction diagrams.

**Unit IV****8 Hrs**

Behavioral Modeling: Use cases- Use case Diagrams- Activity Diagrams. Advanced Behavioral Modeling- State Machines- Processes and Threads- Time and Space- State Chart Diagrams.

**Unit V****8 Hrs**

Architectural Modeling: Components- Modeling Techniques – Modeling a Physical Database- Model an Adaptable System- Deployment - Component diagrams and Deployment diagrams.

**Text Book:** Course materials will be provided

**Reference Books**

| <b>S. No</b> | <b>Author</b>   | <b>Title of the Book</b>  | <b>Publisher</b> | <b>Year of Publication</b> |
|--------------|---|---|------------------|----------------------------|
| 1            | Martina Seidl,<br>Marion Scholz,<br>Christian Huemer, | UML @ Classroom: An<br>Introduction to Object-<br>Oriented Modeling | Springer         | 2015                       |

|   |  |   |                       |      |
|---|--|---|-----------------------|------|
|   | GertiKappel  |   |                       |      |
| 2 | Martina Seidl,<br>Marion Scholz,<br>Christian Huemer,<br>GertiKappel | An Introduction to Object-<br>Oriented Modeling                             | Easy Reader           | 2011 |
| 3 | Gandharba Swain  | Object-Oriented Analysis<br>and Design through Unified<br>Modeling Language | Laxmi<br>Publications | 2010 |

**Note**

\*During Semester III, Unit I, Unit II, till Advanced Classes

\*\* During Semester IV from Advanced Relationships in Unit II, Unit III, Unit IV & Unit V

**Pedagogy**

- Lecture, Demonstration

**Course Designer**

- Dr. S. Karpagavalli

| Course Number | Course Name | Category | L  | T | P | Credit |
|---------------|-------------|----------|----|---|---|--------|
| CS19C07       | DATA MINING | III      | 71 | 4 | - | 4      |

### Preamble

This course covers the basic concepts of data mining principles and methods. It provides insight on classification, and clustering techniques and focuses on applications like web mining, text mining and biological data mining.

### Course Outcomes

On the successful completion of the course, students will be able to

| CO Number | CO Statement  | Knowledge Level |
|-----------|---|-----------------|
| CO1       | Recognize the basic concepts of data mining   | K1              |
| CO2       | Understand the techniques of data classification using various algorithms   | K2              |
| CO3       | Describe the concepts of classifier and prediction for simple data classification task and mining strategies in web | K2              |
| CO4       | Apply various clustering methods for analysis   | K3              |
| CO5       | Illustrate the role of data mining techniques in various fields   | K3              |

### Mapping with Programme Outcomes

| COs | PO1 | PO2 | PO3 | PO4 | PO5 |
|-----|-----|-----|-----|-----|-----|
| CO1 | S   | M   | S   | S   | M   |
| CO2 | S   | M   | S   | S   | M   |
| CO3 | M   | M   | S   | M   | M   |
| CO4 | S   | S   | M   | S   | S   |
| CO5 | S   | S   | S   | S   | S   |

S- Strong; M-Medium; L-Low

**DataMining–CS19C07**

**(71 Hrs)**

### Syllabus

#### Unit I

**14 Hrs**

Introduction: Data Mining – KDD vs Data mining-DBMS vs Data mining-Other

areas-Data mining techniques-Issues and challenges-Application areas.

**Unit II** **15 Hrs**

Association Rule: Introduction-Methods in association rule-Apriori algorithm.  
Clustering: Introduction- Clustering paradigms-Partition algorithm-K-medoid algorithms- CLARA- CLARANS - Hierarchical clustering-DBSCAN-BRICH-CURE.

**Unit III** **14 Hrs**

Decision Tree: Introduction-Tree construction principles-Best split-splitting indices- splitting criteria- Tree construction algorithms: CART-ID3-C4.5-CHAID.

**Unit IV** **14 Hrs**

Other Techniques: Introduction-Neural Networks-Learning in NN-Unsupervised Learning-Genetic algorithm-Support Vector Machine

**Unit V** **14 Hrs**

Data Mining for Bioinformatics: Introduction-Bio medical data analysis-DNA data analysis- Protein data analysis. Web Mining: Introduction-Web mining-content mining- structure mining-usage mining-Text mining- unstructured text-Episode rule discovery for texts- hierarchy of categories-Text clustering.

**Text Book**

| S. No | Author        | Title of the Book      | Publisher        | Year of Publication          |
|-------|---------------|------------------------|------------------|------------------------------|
| 1     | Arun K Pujari | Data Mining Techniques | University Press | 3 <sup>rd</sup> Edition 2013 |

**Reference Books**

| S. No | Author  | Title of the Book            | Publisher         | Year of Publication           |
|-------|---|------------------------------|-------------------|-------------------------------|
| 1     | Yi Ping Phoebe Chen.                            | Bio Informatics Technologies | Springer          | 2 <sup>nd</sup> reprint, 2014 |
| 2     | Pang-NingTan, Michael Steinbach and VipinKumar. | Introduction to Data Mining  | Pearson Education | 2016                          |
| 3     | Max Barmer.                                     | Principles of Data Mining    | Springer          | 3 <sup>rd</sup> Edition, 2016 |

**Pedagogy**

- Lectures, Demonstration, Case studies

**Course Designer**

- Mrs. A.S. Kavitha

| Course Number | Course Name       | Category | L  | T | P | Credit |
|---------------|-------------------|----------|----|---|---|--------|
| CS19C08       | COMPUTER NETWORKS | III      | 71 | 4 | - | 4      |

### Preamble

The course is designed to provide in depth knowledge of the various network layers, network security and client server computing.

### Course Outcomes

On the successful completion of the course, students will be able to

| CO Number | CO Statement  | Knowledge Level |
|-----------|---|-----------------|
| CO1       | Provide an overview of the concepts and fundamentals of data communication and computer networks                | K1              |
| CO2       | Understand the terminology and concepts of the OSI reference model and the TCP-IP reference model               | K2              |
| CO3       | Describe the significance of protocols used in data communications and networking                               | K3              |
| CO4       | Illustrate the importance of network security and application of cryptographic methods in establishing security | K3              |
| CO5       | Interpret the data flow in each layer and services of each layer  | K3              |

### Mapping with Programme Outcomes

| COs | PO1 | PO2 | PO3 | PO4 | PO5 |
|-----|-----|-----|-----|-----|-----|
| CO1 | S   | M   | M   | M   | M   |
| CO2 | S   | S   | M   | M   | S   |
| CO3 | S   | S   | M   | M   | S   |
| CO4 | S   | S   | M   | M   | S   |
| CO5 | S   | S   | S   | S   | S   |

S- Strong; M-Medium; L-Low

## **Computer Networks–CS19C08**

**(71 Hrs)**

### **Syllabus**

#### **Unit I**

**14 Hrs**

Data Communications: Components- data representation- Dataflow Networks: Distributed processing-network criteria -physical structures -network models-categories of networks- Interconnection of Networks: Internetwork- Protocols and Standards: protocols- standards- standards organizations-internet standards the OSI model- layers in the OSI model-TCP/IP protocol suite.

#### **Unit II**

**14 Hrs**

Guided Media: Twisted-pair cable-coaxial cable-fiber-optic cable- unguided media: - wireless: radio waves-microwaves-infrared. Telephone Network: Major components - Latas – signaling services provided by telephone networks dial-up modems: Modem standards digital subscriber line- cable TV networks. Wireless LANS: Bluetooth- connecting devices.

#### **Unit III**

**15 Hrs**

Data Link Layer: Introduction- block coding-framing- flow and error control- protocols- noiseless channels- noisy channels. Network Layer: IPV4 addresses- IPV6 addresses- delivery- forwarding- unicast routing protocols- multicast routing protocols.

#### **Unit IV**

**14 Hrs**

Transport layer: Process-to-Process delivery- user datagram protocol- TCP- congestion control and quality a TCP connection- congestion control- two examples- quality of service

#### **Unit V**

**14 Hrs**

Application Layer: Name space- domain name space- distribution of name space- DNS in the internet- resolution- remote logging- telnet- electronic mail- file transfer- cryptography: Introduction- symmetric-key cryptography- asymmetric-key cryptography.



## Text Book

| S. No | Author             | Title of the Book                  | Publisher        | Year of Publication           |
|-------|--------------------|------------------------------------|------------------|-------------------------------|
| 1     | Behrouz A Forouzan | Data communications and networking | Tata McGraw Hill | 5 <sup>th</sup> Edition, 2012 |

## Reference Books

| S. No | Author                                   | Title of the Book                      | Publisher   | Year of Publication           |
|-------|--|--|---|-------------------------------|
| 1     | Robert Orfali, Dan Harkey, Jerry Edwards | Client/Server Survival Guide           | John Wiley & sons                                 | 3 <sup>rd</sup> Edition, 2008 |
| 2     | Larry L Peterson, Bruce S Davie          | Computer Networks - A systems approach | Elsevier Press                                    | 5 <sup>th</sup> Edition, 2012 |
| 3     | Andrew S Tanenbaum                       | Computer Networks                      | Pearson education                                 | 5 <sup>th</sup> Edition, 2011 |
| 4     | William Stallings                        | Data and Computer Communications       | Prentice Hall of India Private Limited, New Delhi | 8 <sup>th</sup> Edition, 2011 |

## Pedagogy

- Lecture, Demonstration, Case Study

## Course Designer

Dr. S. Karpagavalli

| Course Number | Course Name        | Category | L  | T | P | Credit |
|---------------|--------------------|----------|----|---|---|--------|
| CS19C09       | PYTHON PROGRAMMING | III      | 71 | 4 | - | 4      |

### Preamble

This course provides basic idea on functions and concepts of Python programming.  
This course enables the students to understand the Python programming techniques.

### Course Outcomes

On the successful completion of the course, students will be able to

| CO Number | CO Statement  | Knowledge Level |
|-----------|---|-----------------|
| CO1       | Describe the basic built-in functions and syntax of Python programming. | K1              |
| CO2       | Explain the mapping and file concept.                                   | K2              |
| CO3       | Explain the object oriented programming concept.                        | K2              |
| CO4       | Illustrate the concepts of decision making and construct statements.    | K3              |
| CO5       | Illustrate the usage of database and regular expression                 | K3              |

### Mapping with Programme Outcomes

| COs | PO1 | PO2 | PO3 | PO4 | PO5 |
|-----|-----|-----|-----|-----|-----|
| CO1 | S   | M   | M   | S   | S   |
| CO2 | S   | S   | S   | S   | M   |
| CO3 | S   | S   | S   | S   | S   |
| CO4 | S   | S   | S   | S   | S   |
| CO5 | S   | S   | S   | S   | S   |

S- Strong; M-Medium; L-Low

## **Python Programming - CS19C09**

**(71Hrs)**

### **Syllabus**

#### **Unit I**

**15 Hrs**

Python – origins – features – variable and assignment - Python basics – statement and syntax Identifiers – Basic style guidelines – Python objects – Standard types and other built-in types Internal types – Standard type operators – Standard type built-in functions.

#### **Unit II**

**14 Hrs**

Numbers – Introduction to Numbers – Integers – Double precision floating point numbers Complex numbers – Operators – Numeric type functions – Sequences: Strings, Lists and Tuples – Sequences – Strings and strings operators – String built-in methods – Lists–List type Built in Methods – Tuples.

#### **Unit III**

**14 Hrs**

Mapping type: Dictionaries – Mapping type operators – Mapping type Built-in and Factory Functions - Mapping type built in methods – Conditionals and loops – if statement – else Statement – else-if statement – conditional expression – while statement – for statement – break statement – continue statement – pass statement – Iterators and the iter( ) function - Files and Input/ Output – File objects – File built-in functions – File built-in methods – File built-in attributes – Standard files – command line arguments.

#### **Unit IV**

**14 Hrs**

Functions and Functional Programming – Functions – calling functions – creating functions passing functions – Built-in Functions: apply( ), filter( ), map( ) and reduce( ) - Modules – Modules and Files – Modules built-in functions - classes – class attributes – Instances. Database Programming – Introduction - Basic Database Operations and SQL - Example of using Database Adapters, MySQL.

#### **Unit V**

**14 Hrs**

Bioinformatics Programming - Pattern Matching: fundamental syntax – fixed length matching – variable length matching – the action of the re modules – functions – flags – methods – match object fields – match object methods - Extracting Descriptions from Sequence Files - Extracting Entries From Sequence Files

## Text Books

| S. No | Author           | Title of Book                           | Publisher                     | Year of Publication |
|-------|------------------|---|-------------------------------|---------------------|
| 1     | Wesley J. Chun   | Core Python Programming                 | Pearson Education Publication | 2012                |
| 2     | Mitchell L Model | Bioinformatics Programming using Python | O ' Reilly Media              | 2009                |

## Reference Books

| S. No | Author         | Title of the Book                   | Publisher                     | Year of Publication |
|-------|----------------|-------------------------------------|-------------------------------|---------------------|
| 1     | Wesley J. Chun | Core Python Application Programming | Pearson Education Publication | 2015                |
| 2     | Eric Matthes   | Python crash course                 | William Pollock               | 2016                |
| 3     | Zed Shaw       | Learn Python the Hard Way           | Addition Wesley               | 2017                |
| 4     | Mark Lutz      | Python Pocket Reference             | O'Reilly Media                | 2014                |

## Pedagogy

- Lectures, Group Discussions, Demonstrations, Case studies

## Course Designers

- Dr. R. Vishnupriya

| Course Number | Course Name                                | Category  | L | T | P  | Credit |
|---------------|--|-----------|---|---|----|--------|
| CS20CP4       | Python Programming and Bio Informatics Lab | Practical | - | - | 60 | 3      |

### Preamble

This course includes a practice in the use of basic techniques of Python programming and to implement in real time environment. It enriches the knowledge in programming techniques using pattern matching concepts. It enables to understand object oriented programming concepts.

### Course Outcomes

On the successful completion of the course, students will be able to

| CO Number | CO Statement  | Knowledge Level |
|-----------|---|-----------------|
| CO1       | Define the basic syntax and statements of Python programming                      | K1              |
| CO2       | Discuss the various decision making and construct statement of Python programming | K2              |
| CO3       | Apply object-oriented programming concept in real time problems                   | K3              |
| CO4       | Illustrate pattern matching and extra action using regular expression             | K3              |
| CO5       | Demonstrate mapping using file concept  | K3              |

### Mapping with Programme Outcomes

| COs | PO1 | PO2 | PO3 | PO4 | PO5 |
|-----|-----|-----|-----|-----|-----|
| CO1 | S   | S   | S   | S   | S   |
| CO2 | S   | S   | S   | S   | M   |
| CO3 | S   | S   | M   | S   | S   |
| CO4 | S   | S   | M   | S   | S   |
| CO5 | S   | M   | S   | S   | S   |

S- Strong; M-Medium; L-Low

**List of Programs**

- Exercises using conditionals and loops.
- Exercises for implementing functions.
- Exercises using list and their built-in functions.
- Exercises by implementing tuples.
- Exercises using apply ( ), filter ( ), map ( ) and reduce ( ) functions.
- Exercises by implementing Modules
- Exercises by implementing classes and instances
- Exercises by illustrating regular expression
- Exercises for implementing files concept.
- Exercises using strings and their built-in functions.
- Retrieve nucleotide sequences and perform pair wise and multiple sequence alignment using BLAST tool and analyze the output
- Retrieve nucleotide sequences and perform multiple sequence alignment using CLUSTALW tool and generate phylogenetic tree
- Retrieve two nucleotide sequences to align and generate PAM & BLOSUM scoring matrix
- Convert gene sequence into its corresponding amino acid sequence using translate tool

**Pedagogy**

- Demonstration of working environment / Tools / Software / Program

**Course Designer**

- Dr. R. Vishnupriya

| Course Number | Course Name       | Category | L  | T | P | Credit |
|---------------|-------------------|----------|----|---|---|--------|
| PD20A01       | Digital Marketing | Theory   | 86 | 4 | - | 5      |

### Preamble

This course provides an overall understanding of the various digital marketing platforms and tools available for creating an effective digital marketing strategy. It provides technical skills to design and develop an integrated digital marketing plan for an organization.

### Course Outcomes

On the successful completion of the course, students will be able to

| CO Number | CO Statement  | Knowledge Level |
|-----------|---|-----------------|
| CO1       | Understand the role of digital marketing in marketing strategy          | K2              |
| CO2       | Identify the key elements of a digital marketing strategy               | K1              |
| CO3       | Analyze the role that social marketing plays in the digital marketing   | K3              |
| CO4       | Demonstrate common digital marketing tools such as SEO and Social media | K3              |
| CO5       | Apply conceptual frame works of digital marketing                       | K3              |

### Mapping with Programme Outcomes

| COs | PO1 | PO2 | PO3 | PO4 | PO5 |
|-----|-----|-----|-----|-----|-----|
| CO1 | S   | M   | S   | S   | S   |
| CO2 | S   | S   | M   | S   | M   |
| CO3 | S   | S   | S   | M   | M   |
| CO4 | S   | S   | S   | M   | S   |
| CO5 | S   | S   | M   | S   | M   |

S- Strong; M-Medium; L-Low.

## Digital Marketing - PD20A01

(86 Hrs)

### Syllabus

#### Unit I

17 Hrs

Introduction to Digital Marketing: Introduction - Original and Development of Digital Marketing - Internet Users: Penetration and Kind of Internet Use - Digital Marketing strategy – Digital Advertising Marketing Plan - Ethical and legal of framework of Digital Marketing - Skills Required in Digital Marketing - Digital Advertising: Introduction - Concept of display advertising - Digital Metrics - Types of Digital Ad - Targeting in digital marketing - Challenges faced by display marketing.

#### Unit II

17 Hrs

Search Engine Advertising: Introduction – Why pay for search advertising? – Understanding Ad Placement – Understanding Ad Ranks – Why is the Ad rank important? – Create your first Ad Campaign – Google Ads Account – Best practices for creating effective Ads - Enhance your Ad Campaign – Performance Reports – E-Commerce Social Media Marketing: Introduction - Strategy - Implementation - Measure - Improve - Social Entertainment - Different forms of social entertainment – Gamification.

#### Unit III

17 Hrs

Face book Marketing : Introduction – Organic Marketing – Paid Marketing – Facebook Insights LinkedIn: Introduction - LinkedIn Strategy - Content Strategy - LinkedIn Native Videos - LinkedIn Analytics - Asset Copying - LinkedIn Sales Navigator - Adcampaign - Emerging Platforms: Instagram – Pinterest.

#### Unit IV

18 Hrs

Search Engine Optimization: Introduction – Search Engine – The Concept of SEO – SEO Phases – Website Audit – Content – On-Page Optimization – Off-Page Optimization –Social Media Reach – Maintenance – Local Search SEO – SEO Visual Search – Voice Change will change the SEO Industry – Sub domains vs Subfolders – SEO – UX and UI – Website Navigation - Social Media Icons – External Links – Pop-ups – Advanced Website Features.

#### Unit V

17 Hrs

Mobile Marketing: Introduction – Mobile Advertising – Mobile Marketing Toolkit – Mobile Marketing Features – Mobile Analytics – Mobile APPS. Digital Analytics: Introduction – Data Collection – Key Metrics – Outcome Analysis – Experience Analysis – Making Web Analytics Actionable – Creating High- Impact Executive Dashboards – Types of Tracking Code – Competitive Intelligence.

### Text Book

| S. No | Author      | Title of the Book | Publisher             | Year of Publication           |
|-------|-------------|-------------------|-----------------------|-------------------------------|
| 1     | Seema Gupta | Digital Marketing | McGraw Hill Education | 2 <sup>nd</sup> Edition, 2018 |



## Reference Books

| S. No | Author            | Title of the Book  | Publisher                                 | Year of Publication           |
|-------|-------------------|--|---|-------------------------------|
| 1     | Simon Kingsnorth  | Digital Marketing Strategy: An Integrated Approach to Online Marketing | Kogan Page                                | 2 <sup>nd</sup> Edition, 2019 |
| 2     | Dave Chaffey      | Digital Marketing  | Pearson                                   | 7 <sup>th</sup> Edition, 2019 |
| 3     | Stephanie Diamond | Digital Marketing All-in-One For Dummies                               | For Dummies                               | 1 <sup>st</sup> Edition, 2019 |
| 4     | Kevin Hartman     | Digital Marketing Analytics: In Theory And In Practice                 | Ostmen Bennett Bridge Publishing Services | 2 <sup>nd</sup> Edition, 2020 |

## Pedagogy

- Lectures, Group discussions, Demonstrations, Case studies

## Course Designer

- Dr. C. Arunpriya

| Course Number | Course Name | Category | L  | T | P | Credit |
|---------------|-------------|----------|----|---|---|--------|
| PM20A02       | M-Commerce  | Theory   | 86 | 4 | - | 5      |

### Preamble

This course provides an insight on M-Commerce principles and business models. It also explore the concept of mobile commerce technologies, applications, mobile payment methods, security, and ethics.

### Course Outcomes

On the successful completion of the course, students will be able to

| CO Number | CO Statement   | Knowledge Level |
|-----------|--|-----------------|
| CO1       | Understand the fundamental concept of E- commerce and process of business models | K1              |
| CO2       | Knowledge on M- Commerce applications and architecture                           | K1              |
| CO3       | Differentiate the payment methods in M- payment and security                     | K2              |
| CO4       | Analyze the infrastructure, fraud prevention and payment methodologies           | K3              |
| CO5       | Examine the legal and ethical issues in mobile commerce                          | K3              |

### Mapping with Programme Outcomes

| COs | PO1 | PO2 | PO3 | PO4 | PO5 |
|-----|-----|-----|-----|-----|-----|
| CO1 | S   | M   | S   | S   | S   |
| CO2 | S   | S   | M   | S   | M   |
| CO3 | S   | S   | S   | S   | M   |
| CO4 | S   | S   | S   | M   | S   |
| CO5 | S   | S   | M   | S   | M   |

S- Strong; M-Medium; L-Low.

**M-Commerce - PM20A02****(86 Hrs)****Syllabus****Unit I****17 Hrs**

Introduction to E- commerce: Introduction – E-commerce – E-business – Categories of E- commerce applications – Global trading environment – Adoption of E-commerce – Traditional and Electronic commerce – Advantages and disadvantages of E- commerce. Business Models of E-commerce: Introduction – Business models of E-commerce- Business to Consumer (B2C) – Business to Business (B2B) –Difference between B2C and B2B – C2C: Definition –Characteristics and Applications of C2C EC – Consumer to Business (C2B) – Business to Government (B2G).

**Unit II****17 Hrs**

Mobile commerce and WAP: Introduction to Mobile commerce – Application – Advantages of M-commerce – Wireless Application Protocol – WAP Browser – Features of WAP 2.0 – Technologies of M- commerce – Overview of WML – Architectures of mobile commerce.

**Unit III****17 Hrs**

Mobile commerce Risk, Security and Payment Methods: Introduction – Security and Payment Methods – Mobile Commerce Security – Security Mechanism – Mobile Security – Network Infrastructure and Security- WLAN and Security – WAP and Security - Mobile commerce payment methods – Mobile payment operations – Mobile payment standardization – Reputation and trust – Application and Risk scenarios – Reputation systems – Trust model.

**Unit IV****18 Hrs**

Mobile Money Infrastructure and Fraud Prevention for M- Payment: Introduction –Requirement for authentication infrastructure for M-commerce – Trust relationship – Requirement for Mobile commerce – Password based authentication for mobile users with support for public key technology – M – payment value chain – Life cycle - Operational Issues in M- Commerce payment – Mobile payment systems – General analysis of the payment solutions – Fraud management systems in M-commerce – Mobile payment and money transfers – Mobile payment landscapes.

**Unit V****17 Hrs**

Legal and Ethical Issues: Introduction – Issues related to E- commerce – Legal issues – Taxation and E-commerce – Cyber Laws: Introduction – Cyber laws in India – Salient Provisions of Cyber Law – Contracting and contract Enforcement - IT act 2000 – Jurisprudence of Indian cyber law – Salient features of the Information Technology act 2008.

**Text Book**

| <b>S. No</b> | <b>Author</b>                           | <b>Title of the Book</b>                        | <b>Publisher</b>               | <b>Year of Publication</b>               |
|--------------|---|---|--------------------------------|--|
| <b>1</b>     | Dr. U.S. Pandey &<br>Er. Saurabh Shukla | E- Commerce and Mobile<br>Commerce Technologies | S. Chand & Company<br>Pvt. Ltd | 2 <sup>nd</sup> Revised<br>Edition, 2014 |

## Reference Books

| S. No | Author               | Title of the Book   | Publisher                                    | Year of Publication           |
|-------|----------------------|---|--|-------------------------------|
| 1     | Karabi Bandyopadhyay | Mobile Commerce   | Prentice Hall India Learning Private Limited | 2013                          |
| 2     | Paul May             | Mobile Commerce: Opportunities, Applications, and Technologies of Wireless Business | Cambridge University Press;                  | 1 <sup>st</sup> Edition, 2001 |
| 3     | Norman Sadeh         | M-Commerce: Technologies, Services, and Business Models                             | John Wiley & Sons,                           | 2003                          |

## Pedagogy

- Lectures, Group discussions, Demonstrations, Case studies

## Course Designer

- Dr. R. Kavitha

| Course Number | Course Name  | Category | L | T | P  | Credit |
|---------------|--|----------|---|---|----|--------|
| PR19SBP1      | Skill Based Subject<br>Data Analytics - Practical I: R-<br>Programming | III      | - | - | 45 | 2      |

### Preamble

This course is used to understand the concepts used to perform vector operations and matrix operations. It familiarizes the students with various statistics operations mean, median etc., are performed. It enables the student to explore data from a variety of sources by building regression model and to generate charts, graphs, and other data representations.

### Course Outcomes

On the successful completion of the course, students will be able to

| CO Number | CO Statement   | Knowledge Level |
|-----------|--|-----------------|
| CO1       | Understand the fundamental syntax of R through demonstrations, and writing R code                          | K2              |
| CO2       | Apply concepts such as data types, iteration, control structures, functions, and Boolean operators using R | K2              |
| CO3       | Able to import a variety of data formats into R using R Studio   | K3              |
| CO4       | Explore data-sets to perform appropriate statistical tests using R   | K3              |
| CO5       | Acquire skills to generate charts and graphs visualization using R   | K3              |

### Mapping with Programme Outcomes

| COs | PO1 | PO2 | PO3 | PO4 | PO5 |
|-----|-----|-----|-----|-----|-----|
| CO1 | S   | M   | S   | M   | S   |
| CO2 | S   | S   | S   | M   | M   |
| CO3 | S   | S   | S   | S   | M   |
| CO4 | M   | S   | M   | S   | S   |
| CO5 | S   | S   | M   | S   | M   |

S- Strong; M-Medium; L-Low.

**Data Analytics - Practical I: R Programming – PR19SBP1(45 Hrs)**  
**List of Programs**

- R Program for Vector operations
- Create a R-list
- Implement matrices addition, subtraction and Multiplication
- Create a Data frame
- Create a factor object
- Import data, copy data from CSV file to R
- Create a R program for Mean median and mode
- Draw Bar charts and Pie charts in R
- Make visual representations of data for plotting functions in R
- Create a R program for Regression Model

**Note**

\*During Semester III - Exercise 1 to Exercise 6

\*\*During Semester IV- Exercise 7 to Exercise 10

**Pedagogy**

- Demonstration, System

**Course Designer**

- Mrs. V. Deepa

| Course Number | Course Name  | Category | L | T | P  | Credit |
|---------------|--|----------|---|---|----|--------|
| PD19SBP1      | Skill Based Subject<br>OOSE - Practical I: Software Design Tools | III      | - | - | 45 | 2      |

### Preamble

The objective of this course is to enable the student to practice the object-oriented analysis and design through UML diagrams for real time software applications

### Course Outcome

On the successful completion of the course, students will be able to

| CO Number | CO Statement   | Knowledge Level |
|-----------|--|-----------------|
| CO1       | Design ERD and DFD for real time problem                     | K2              |
| CO2       | Draw use-case and activity diagram for the given application | K2              |
| CO3       | Construct state chart and sequence diagram for use-cases     | K3              |
| CO4       | Build collaboration and class diagram for modules            | K3              |
| CO5       | Gain knowledge to build UML diagrams for real world problems | K3              |

### Mapping with Programme Outcomes

| COs | PO1 | PO2 | PO3 | PO4 | PO5 |
|-----|-----|-----|-----|-----|-----|
| CO1 | S   | M   | S   | M   | S   |
| CO2 | M   | S   | S   | S   | M   |
| CO3 | S   | M   | M   | S   | S   |
| CO4 | S   | S   | M   | M   | S   |
| CO5 | S   | S   | S   | S   | M   |

S- Strong; M-Medium; L-Low.

**List of Programs**

To apply and develop the UML diagrams for applications.

Choose any one of the projects given below and do the exercises program for the project. [Student Marks Management System, Library Management System, Employee Management System, Hostel Management System].

- Write the complete problem statement
- Write the software requirement specification document 70973821
- Draw the entity relationship diagram
- Draw the data flow diagrams at level 0 and level 1
- Draw use case diagram
- Draw activity diagram of all use cases
- Draw state chart diagram of all use cases
- Draw sequence diagram of all use cases
- Draw collaboration diagram of all use cases
- Assign objects in sequence diagram to classes and make class diagram

**Note**

\* During Semester III -Exercise 1 to Exercise 6

\*\* During Semester IV - Exercise 7 to Exercise 10

**Pedagogy**

- Demonstration, System

**Course Designer**

- Dr. S. Karpagavalli